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CHAPTER V

CHANGES IN CONCENTRATION AND RELATED VARIABLES

The long-run trend of concentration will be examined in this chapter, and changes during World War II will be studied in some detail. The statistics available for this investigation deal with plants only, so that firm concentration cannot be studied, and there is little information on changes in individual industries. Nevertheless, much can be learned from an analysis of the available material.

1. *Trends in Plant Concentration*

MANUFACTURING AS A WHOLE

Concentration by *plants* for manufacturing *as a whole* showed remarkable stability in the period between the wars (Table A-2). Apart from minor year-to-year fluctuations, concentration of output remained unchanged from 1922 to 1939, while concentration of employment diminished slightly. During World War II, however, concentration increased sharply to a 1943 peak and then declined even more sharply, so that the level of plant concentration in 1948 was well below that of 1922–1939.

Comparable statistics are not available for the period before 1922 but there is some evidence that plant concentration for manufacturing as a whole increased substantially between 1890 and 1922.[1]

These changes in concentration for manufacturing as a whole may

[1] In 1922, 936 plants accounted for 66 per cent of the value of output, while in 1890, 2,879 plants accounted for 63 per cent of output, and 1,673 plants accounted for 54 per cent. The census of 1890, however, included certain industries omitted in 1922 in which small plants predominated. A completely accurate adjustment for these industries cannot be made because of changes in industrial classification, but the data indicate that these industries account for no more than 10 per cent of output in 1890. Making the extreme assumption that none of their plants were among the largest 1,673 plants, omission of these industries in 1890 would raise the percentage of output accounted for by the largest 1,673 plants to 60 per cent. This still represents an appreciably lower level of concentration than that of 1922. *The Manufacturing Industries of Canada, 1922,* and *Census of Canada, 1901,* Ottawa, King's Printer, Vol. III, pp. 324–325.

reflect changes in concentration within individual industries, but they may also be affected by shifts in the relative size of industries with high and low concentration, changes in the distribution of average firm sizes of the different industries, and other changes. Changes in concentration within industries cannot be analyzed for most of the period under consideration, since plant-size distributions for individual industries are only available in recent years. The effect of shifts in the relative size of industries with high and low concentration can, however, be examined, and compared with the trends in over-all concentration just discussed. It will be assumed that where the change in over-all concentration that would result from shifts in the relative size of industries is in the opposite direction to the actual change in over-all concentration, the latter must reflect mainly changes in concentration *within* industries.

CHANGES IN THE RELATIVE SIZES OF INDUSTRIES

The influence of shifts in the relative size of industries with high and low concentration will be studied by means of a sample of 47 industries consisting of those that are among the 38 largest industries (in terms of employment) in any of the years 1922, 1929, 1939, 1943, or 1948.[2]

[2] The sample is used to study the change in a weighted average concentration index. Since concentration is negatively correlated with industry size (Chapter II), the omission of small industries means that the sample understates concentration (i.e. overstates the numerical value of the average index). But changes in the relative size of industries that are small *and stay small* are not likely to have a significant effect on the direction of change of the weighted average. Since there are about 180 industries altogether, much labor is saved and little accuracy lost by confining the analysis to the largest industries. Changes in industrial classification affecting the sampled industries have been taken into account, but it would require an enormous amount of work to make the necessary corrections for all industries.

Industries that are small in one period but large in another are included in the sample, since it comprises those that are among the 38 largest in *any* of the key years analyzed.

The sample accounts for the following percentages of total manufacturing employment:

	(*per cent*)
1922	78
1929	80
1939	78
1943	72
1948	76

The following industries are included in the sample:

Bread and other bakery products, fish curing and packing, butter and cheese, slaughtering and meat packing; cocoa, confectionery, etc.; fruit and vegetable preparations, flour and feed mills, cigars and cigarettes, biscuits and crackers, breweries, soft drinks.

If the plant concentration index for each of the 47 industries is held constant at its 1948 level, the harmonic mean concentration index [3] (using industry size as weights) for the group as a whole varies as follows:

1922 – 24.4
1929 – 20.3
1939 – 20.3
1943 – 12.9
1948 – 19.3

Since concentration ratios are held constant the variation shown in this weighted average reflects only shifts in the weights. The average index falls when industries with high concentration become relatively larger and rises when the relative size of industries with low concentration increases.

Between 1922 and 1929 there was an increase in the relative importance of industries with high concentration. Over half the increase in the average concentration index is accounted for by the rise of the automobile industry [4] which had 1.6 per cent of total manufacturing

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Men's clothing factories, cotton yarn and cloth, hosiery and knitted goods, rubber goods, women's clothing factories, leather boots and shoes, synthetic textiles and silk, woolen cloth, leather tanneries, hats and caps.

Pulp and paper, printing and publishing, furniture, planing mills, sawmills, miscellaneous paper products, paper boxes and bags, printing and bookbinding.

Primary iron and steel, nonferrous metals smelting and refining, railway rolling stock, electrical apparatus, automobiles, machinery, agricultural implements, sheet metal products, shipbuilding, machine shops, iron castings, aircraft, wire and wire goods, bridge and structural steel.

Petroleum products, clay products; acids, alkalies and salts; scientific and professional equipment.

[3] Number of largest plants in an industry accounting for 80 per cent of employment. The harmonic mean is the reciprocal of the weighted arithmetic mean of the reciprocals of these indexes.

The harmonic mean is used because the frequency distribution of the concentration index is highly skewed towards the high numerical values, even when frequency is measured in terms of employment (see Table 5 for the distribution of the firm concentration index). Hence an arithmetic mean, which would be very sensitive to the few industries with very high concentration numbers, would be unrepresentative, while the harmonic mean is closer to the median value.

[4] I.e. over half the increase in the weighted average of reciprocals is contributed by the automobile industry. The contribution of each industry to the change in the weighted average between years i and j was computed as $(c - \Sigma cw_{48}) \times (w_i - w_j)$ where c is the reciprocal of the industry's concentration index, w is the industry's employment as a proportion of total employment in the sample of 47 industries (so that $\Sigma w = 1$), and the subscripts 48, i, and j stand for the respective years. Hence $(c - \Sigma cw_{48})$ represents the industry's deviation from average concentration in 1948 and $(w_i - w_j)$ represents the change in the industry's relative importance. The sum, for all 47 industries, of the products of

employment in 1922 and 2.5 per cent in 1929. Smaller contributions to the increase were made by the nonferrous metals industry which rose from 0.7 per cent of total manufacturing employment in 1922 to 1.2 per cent in 1929 and by the railway rolling stock industry which increased from 2.0 per cent to 3.8 per cent of total employment in the same period. On the other hand, such industries with typically low concentration as men's clothing and "printing and publishing" declined in importance from 3.7 per cent to 3.2 per cent of total employment and from 3.0 per cent to 2.5 per cent respectively.

In the same period employment concentration for manufacturing as a whole decreased slightly (Appendix A, Table A-2), so that it seems probable that on the average there was a *decrease* in plant concentration *within* industries. This conclusion cannot, however, be established beyond doubt since plant-size distributions for individual industries are not available.

Between 1929 and 1939 both the index of concentration for manufacturing as a whole and the weighted average of 1948 concentration indexes show great stability, suggesting that *on the average* there was little change in concentration within industries, although again the data are not sufficient to establish this conclusion with certainty.

Shifts in the relative importance of industries lowered the average concentration index (i.e. raised the level of concentration) from 20.3 in 1939 to 12.9 in 1943. This change is almost entirely accounted for by the growing importance of the aircraft and shipbuilding industries, which expanded rapidly to meet war requirements.[5] The aircraft industry accounted for 0.8 per cent of total manufacturing employment in 1939 and 8.5 per cent in 1943, while shipbuilding rose from 0.7 per cent to 9.3 per cent. It seems likely therefore that the corresponding wartime increase observed in the concentration index for manufacturing as a whole (Appendix A, Table A-2) reflects the increasing importance of war industries rather than an increase in plant concentration within industries.

From 1943 to 1948 the weighted average concentration index rose

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the two expressions is equal to $\Sigma cw_i - \Sigma cw_j$, i.e. the change in the weighted average.

(If the simpler formula $c(w_i - w_j)$ were used for an industry's contribution, increasing relative size of an industry with low c would not appear to make any contribution towards a fall in the average.)

Between 1922 and 1929 the change in the weighted average of reciprocals was 0.0081. The automobile industry contributed 0.0054, nonferrous metals accounted for 0.0008, and other industries for smaller amounts.

[5] The change in the weighted average of reciprocals was 0.029. The aircraft industry contributed 0.019 and shipbuilding accounted for 0.002.

from 12.9 to 19.3; this indicates the declining relative importance of industries with high concentration. Again, the major part of the change is accounted for by the aircraft industry, with a smaller contribution from shipbuilding. The former fell in importance from 8.5 per cent of total manufacturing employment in 1943 to 1 per cent in 1948, and the latter declined from 9.3 per cent to 2.3 per cent. Thus the decline in over-all concentration over the same period (Table A-2) must be attributed, in part at least, to the declining importance of war industries with high concentration.

CHANGES IN CONCENTRATION WITHIN INDUSTRIES

Changes in plant concentration within each of a limited sample of industries can be studied for the later 1930's and the war and postwar periods (Table A-6). Table 31, summarizing the wartime changes, supports the conclusion that the wartime increase in concentration for manufacturing as a whole is the result of the increasing importance of war industries. Only five of the sixteen industries examined show an increase in concentration between 1936 or 1937 and 1943 (flour and feed mills, cotton yarn and cloth, butter and cheese, automobiles, leather tanning). In two of these industries (flour and feed mills, butter and cheese) the increase appears to be part of a continuing trend, since concentration rises further in the postwar period, when most industries exhibit declining concentration. Increasing plant concentration within industries was therefore not a typical pattern in the wartime upswing of business.

There is a frequently encountered view that concentration tends to rise in a war economy, when large firms get a disproportionate share of war orders and government aid in plant expansion, while the number of new entrants is limited by shortages and the accompanying controls. The trends in plant concentration reviewed here do not support this view, but the interpretation of our findings is subject to two important qualifications. First, there is no information on changes in concentration by firms during this period. Second, while concentration may not have increased, there is little doubt that the war and the accompanying controls stimulated the development of institutions, practices, and attitudes making for reduced competition. Of 164 manufacturing and mining trade associations recorded in Canada in 1947, 41 were founded in the period 1942–1944.[6] In the controlled wartime economy "business men learned to work more closely together and to accept, as a matter of common practice, the discus-

[6] Compiled from: *13th Report on Organization in Industry, Commerce, and the Professions,* Ottawa, Department of Labour, 1947.

sion of aspects of their business which, under peacetime conditions might have been regarded as matters of individual decision." [7]

Between 1943, the peak year of war employment, and 1948 there was a further significant decline in plant concentration within industries. Thirteen of the sixteen industries examined show declining plant concentration (Table 31), and the level of concentration in 1948 is lower than in 1936 in eight of the eleven industries for which a direct comparison can be made.

TABLE 31

Plant Concentration in Sixteen Manufacturing Industries, 1936–1948

INDUSTRY	INDEX OF CONCENTRATION OF EMPLOYMENT [b]		
	1936	*1943*	*1948*
Automobiles	1.8	1.5	1.7
Nonferrous metals	4.1	6.1	5.4
Petroleum refining	10.8	11.3	11.8
Cotton yarn and cloth	15.4	14.9	16.3
Slaughtering & meat packing	23.3	25.2	31.2
Electrical apparatus & supplies	31.9	34.0	47.3
Pulp and paper mills	40.1	44.8	49.1
Women's clothing factories	231 [a]	346	529
Flour and feed mills	283.9	226.5	184.3
Sawmills	554.0	1,418.1	1,993.7
Butter and cheese factories	894.5	645.2	442.0

	CONCENTRATION OF OUTPUT [b]		CONCENTRATION OF EMPLOYMENT [b]	
	1937	*1943*	*1943*	*1948*
Synthetic textiles and silk	7.9	9.2	10.1	13.8
Leather tanning	16.9	15.1	18.4	19.3
Paints and varnishes	20.0	22.4	24.7	26.6
Boots and shoes	77.7	84.6	92.5	110.7
Furniture	92.7	114.1	120.6	287.2

[a] Figures for 1934.

[b] Number of largest plants accounting for 80 per cent of output or employment.

Source: Appendix A, Table A-6.

The decrease observed in the concentration index for manufacturing as a whole between 1943 and 1948 therefore reflects both the shift from war to civilian industry after the peak of war production, and decreasing concentration within many industries. The latter appears to be the result of the rapid expansion of business and of industrial capacity that followed the alleviation of wartime shortages and the removal of controls. The total number of manufacturing

[7] *Report of the Royal Commission on Prices,* Ottawa, King's Printer, 1949, Vol. II, p. 251.

plants rose from 27.7 thousand in 1943 to 29.0 thousand in 1945 and 33.4 thousand in 1948, thus tending to reduce concentration.

2. *Interpretation of the Long-Run Trend*

The level of concentration for manufacturing as a whole was appreciably lower in 1948 than in 1929 or 1922. Industries with high concentration were, however, relatively more important at the latter date, as shown by the change in the weighted average of 1948 concentration ratios discussed above. These facts suggest that the trend in plant concentration within industries was probably on the average downward rather than upward, over the period as a whole.

It is interesting to compare these changes in concentration with the trends envisaged by well-known theories. There are many versions of the theory that increasing concentration is inherent in a system of industrial capitalism. According to Marx, technical progress involves a continual substitution of machinery for labor, and the use of more and larger machinery requires a continual increase in the scale of production, which is made possible by the persistent accumulation of capital on the part of individual capitalists. Larger plants, it is implied, mean larger firms, hence fewer firms and higher concentration. Large firms, producing more cheaply than the small, can grow faster and finally eliminate the smaller competitor.[8] Increasing firm concentration is thus deduced from technological development and increasing size of *plant*, but there is also a brief reference to the development of a credit system, which makes it possible to draw funds "scattered over the surface of society" into the hands of individual or associated capitalists, thus promoting concentration.[9] A similar view of increasing concentration based on internal economies was shared by many later economists, and such economies were stressed by the promoters of the trust movement of the 1890's.[10]

One of the latest and most explicit versions of the theory is that of B. S. Keirstead who states that "we know on empirical grounds that the facts of modern industry are that the number of firms tends steadily to decline while the modal firm increases in size. . . . The reason for this is to be found in the typical technology of our period. The process is to introduce new, more efficient machine units, involving the substitution of machinery for labor, and thus increasing

[8] Karl Marx, *Das Kapital*, 2nd ed., Hamburg, Meissner, 1872, Vol. I, pp. 647–651.

[9] *Ibid.*, p. 651.

[10] Cf. A. S. Dewing, *Corporate Promotions and Reorganizations*, Harvard University Press, 1930, pp. 523–529.

the scale of undertaking while altering in favor of fixed capital the combination of the factors." [11] Keirstead develops dynamic models in which the passage of time is defined in terms of this form of technological advance: "A unit of time, therefore, consists of the introduction of new, qualitatively different, machinery (or other fixed plant), involving ordinarily an increase in size" (p. 243).

The theories of increasing concentration based on technological development have been attacked from a number of directions. There is little doubt that both substitution of machinery for labor and increasing scale of production characterized the change from handicraft production to a factory system, and in the early stages of factory production the major improvements consisted in the increase of machine capacity and extension of mechanization to further processes. It is not obvious, however, that this form of improvement must dominate technical progress once production has been mechanized. In fact, J. M. Blair suggests that the dominant trend of technological progress since the end of World War I has been toward capital-saving innovations and smaller average size of plant.[12]

Other writers have questioned the existence of the economies of scale from which the theories of increasing concentration deduce the superior power of large firms.[13] On this basis they have maintained either that there is no trend toward increasing concentration or that growth of firm size is to be explained in terms of "opportunities for promoter profit, personal ambitions of industrial and financial 'Napoleons' and advantages of monopoly power" [14] rather than technical developments.

Even if the existence of a trend toward increasing firm size is accepted, increasing concentration is by no means a necessary conse-

[11] B. S. Keirstead, *The Theory of Economic Change*, Toronto, Macmillan, 1948, pp. 242–243 (see also pp. 239–240 and note the qualifications on pp. 274–275).

[12] J. M. Blair, "Technology and Size," *American Economic Review*, May 1948, pp. 121–152.

[13] E.g., F. A. Fetter in *Relative Efficiency of Large, Medium-sized and Small Business*, Temporary National Economic Committee, Monograph 13, 1941, p. 404; Henry C. Simons, "A Positive Program for Laissez Faire" in *Economic Policy for a Free Society*, University of Chicago Press, 1948; Corwin D. Edwards, *Maintaining Competition*, McGraw Hill, 1949, pp. 113–120. These writers question the existence of such economies in the largest firms on the grounds that economies of scale must be internal to the plant while the largest firms in many industries have several plants. Other writers question the existence of economies on the ground that smaller firms are not, in fact, eliminated, e.g. George J. Stigler, "Monopoly and Oligopoly by Merger," *American Economic Review*, May 1950, p. 26.

[14] Simons, *op. cit.*, p. 13.

quence. Many writers have pointed out that technical developments have increased the size of the market by improvements in transportation, communications, packing, storage, etc., in addition to the increase due to population growth. This growth of the market means that concentration need not increase even when firms become larger.

The trends in concentration in Canada discussed above do not support a theory of increasing concentration, at least so far as plants are concerned. There probably was such a trend in the period 1890 to 1920, as the figures for manufacturing as a whole suggest. In the period since 1922, however, there is no evidence of increasing plant concentration. There may, of course, have been an increase in firm concentration based on the growing importance of multi-plant firms. There is evidence of a substantial "merger wave" in the late 1920's [15] and, as discussed in Chapter III, in many of the industries in which concentration is high and multi-plant firms are important, the leading firms owe much of their present size to mergers in that period. On the other hand, in the majority of industries the number of plants per firm was still very small in 1948, even among the largest firms,[16] so that when the average of all industries is considered, it does not seem likely that there was a substantial increase in concentration as a result of mergers. In any event such an increase could not be ascribed to the trend of technical development inside the plant envisaged by the theories reviewed above.

An empirical examination of each of the propositions of the theory of increasing concentration will indicate just why the theory as a whole does not fit the developments in Canadian manufacturing. Changes in the horsepower capacity of prime movers per employee can serve as a rough index of the substitution of capital for labor (see Chapter II). While this ratio shows a strong counter-cyclical pattern (Table A-5) because of the cyclical variation in employment, the trend can be seen by comparing peak years of the business cycle. This comparison indicates an upward trend between 1923 and 1948, if the war period is omitted (Table 32, column 1). The low ratio for 1943 probably reflects the operation of an exceptional number of shifts during the war. The high ratios for 1937 and 1939 reflect a substantial degree of excess capacity.[17] The sketchy data available for the period preceding 1923 also indicate a rising trend.

[15] Cf. *Report of the Royal Commission on Price Spreads,* Ottawa King's Printer, 1935, p. 28. Out of a total of 374 mergers studied, 231 took place between 1925 and 1930, and 58 in the period 1909–1912.

[16] See Table 22.

[17] The percentage of unemployment in the civilian labor force in Canada is estimated at 8 per cent in June 1941 and was undoubtedly higher in 1939 and

Does this trend of increasing mechanization for manufacturing as a whole represent increasing mechanization within industries or the growing relative importance of industries with a high ratio of horsepower per employee? Analysis of a sample of 47 industries [18] indicates that if horsepower per employee for each industry had remained constant at the 1939 level, the average for all industries would have fallen from 9.3 in 1923 to 8.8 in 1948 showing the increasing relative impor-

TABLE 32

Horsepower per Employee in Canadian Manufacturing Industries

	All Industries (1)	*47 Selected Industries* [b] (2)	*47 Selected Industries, Average of 1939 Ratios Weighted by Employment in Each Year* (3)
1917	2.7		
1923	4.2	4.7	9.3
1929 [a]	5.8	6.4	9.1
1937	7.1		
1939	7.7	8.6	8.6
1943	5.2	5.9	8.4
1948	7.1	8.0	8.8

[a] The ratio in columns (1) and (2) is understated slightly relative to other years because of a different method of computing annual average employment. The sum of wage earners reported each month by an establishment is divided by number of months of operation, while in other years it is divided by twelve.

[b] The 38 largest industries in terms of employment in 1922, 1929, 1939, 1943 and 1948 (see note 2, sec. 1).

Source: Appendix A, Table A-5; and *The Manufacturing Industries of Canada, 1923, 1929, 1939, 1943, and 1948,* Ottawa, Dominion Bureau of Statistics.

tance of industries with a low ratio (Table 32). The increase shown in the actual average between these dates (columns 1 and 2) therefore reflects increasing mechanization within industries.

For the earlier period a similar analysis has not been possible, but there is little doubt that increasing mechanization characterized many industries between 1890 and 1920. As a matter of fact, since industries were classified partly on the basis of the process of production, some

1937. In June 1944, however, it was only 1.8 per cent and in June 1948, 1.6 per cent (*Canadian Statistical Review,* August 1948, p. 2). Data for 10 major United States industries analyzed by Bert G. Hickman at the National Bureau of Economic Research (unpublished) indicate that in most cases the degree to which capacity was utilized was lower in 1937 than in 1929, while the highest level reached during the war was above that of 1929. The level for 1948 was also well above 1929.

[18] Consisting of those that are among the 38 largest industries in any of the years 1922, 1929, 1939, 1943, 1948 (see note 2, section 1).

of the shifts in the relative importance of industries represented increasing mechanization in the production of a given end product. Thus between 1890 and 1920 there was a relative decline of tailoring and dressmaking while men's and women's clothing factories grew in importance.[19]

The trend in mechanization in Canadian manufacturing has therefore been in accord with that envisaged by the theories of increasing concentration. Was increasing mechanization accompanied by a growing size of plant?

TABLE 33

Size of Plant in Canadian Manufacturing Industries

	NUMBER OF EMPLOYEES PER PLANT			
	All Industries (1)	*47 Selected Industries* [b] (2)	*47 Selected Industries Weighted Average of 1939 Ratios* [c] (3)	*Horsepower Capacity per Plant (All Industries)* (4)
1917	27.8			75.9
1922	21.7	21.7	26.0	
1923	24.0			101.9
1929 [a]	30.0	30.8	27.1	173.6
1937	26.6			189.7
1939	26.5	26.5	26.5	203.4
1943	44.9	41.8	26.3	232.0
1948	34.6	35.2	26.6	243.9

[a] Number of employees per plant in columns (1) and (2) overstated as compared with other years (see Table 32, note a).

[b] Same as note b, Table 32.

[c] An industry's weight in a given year is its number of plants in that year.

Source: Appendix A, Table A-5 and *The Manufacturing Industries of Canada, 1948,* Ottawa, Dominion Bureau of Statistics, p. 7, also for the years 1922, 1929, 1939, and 1943.

The number of employees per plant (Tables A-5 and 33) was the same in 1937 as in 1920 and exhibits cyclical variation but no definite trend in the intervening period. It has been shown, however, that mechanization was increasing, so that plant size, when measured in terms of horsepower capacity, rose steadily (Table 33, column 4) and there was probably an increase in capacity, measured in terms of potential output. During World War II employment per plant rose

[19] In 1921, 66 per cent of employment in men's clothing was in factories and 34 per cent in custom tailoring establishments. In 1901 the proportion of employment recorded in factories was only 57 per cent, even though only establishments with 5 or more employees were enumerated.

In women's clothing the proportion of employment in factories was 88 per cent in 1921 and only 33 per cent in 1901 even though establishments with less than 5 employees were not enumerated in 1901. *Canada Year Book, 1922–23,* and *Census of Canada, 1901,* Vol. 3, pp. 116–117.

rapidly, and while there was a decline after the war, the level of 1948 remained well above prewar.[20]

These changes in the average size of plant reflected changes within industries, rather than variation in the relative importance (in terms of number of plants) of industries with large and small plants. The effect of changes in the relative importance of different industries, is shown by the weighted average of 1939 employment-per-plant ratios, using, each year, the number of plants in an industry as that industry's weight (Table 33, column 3). The resulting average changes very little between 1922 and 1948.

The trend in the period 1920 to 1948 was therefore toward increasing plant capacity within industries. The available statistics do not permit a comparison of plant size in 1890 and 1920 but it is probable that plant size increased, as the factory replaced the workshop in many industries during this period.[21]

The trends in plant size thus also correspond to those envisaged by the theories of increasing concentration, yet the trend in plant concentration, as indicated above, does not. The reason is that the market for manufactured goods grew more rapidly than the average size of plant, so that the number of plants tended to increase (Table A-5). The number of employees in manufacturing rose from 506 thousand in 1923 to 660 thousand in 1937 and 1,241 thousand in 1943. While there was a decline from this wartime peak, the number in 1948 was 1,156 thousand—well above the prewar level. The index of the volume of manufacturing production (on the base 1935–1939 = 100) rose from 67.5 in 1923 to 101.4 in 1929 and 107.8 in 1939. During the war it rose abruptly to 217.3 in 1943, then declined to 169.0 in 1946 and rose again to 192.1 in 1948.[22] Changes in the current value of manufacturing output are shown in Table A-5.

The rising trend of output and employment in manufacturing reflects both the growth of the Canadian economy and the increasing importance of manufacturing in the economy. Between 1923 and

[20] An index of real output per plant on the base 1935–1939 = 100 rose from 79 in 1923 to 112 in 1929 and fell only slightly, to 108, in 1937. It thus rose by 37 per cent between 1923 and 1937 while employment per plant (Table 33) rose by only 11 per cent. The difference reflects in part the increasing mechanization discussed above. The index of real output per plant rose to 193 in 1943 and stood at 141 in 1948 (Source: Index of real output from *The Manufacturing Industries of Canada, 1948*, p. 16 and *Canadian Statistical Review*, April 1951, p. 12. This index was divided by an index of number of plants, computed from Appendix A, Table A-5).

[21] See note 19.

[22] *The Manufacturing Industries of Canada, 1948*, p. 16 and *Canadian Statistical Review*, April 1951, p. 12.

1948 the population of Canada increased by 42 per cent while employment in manufacturing increased by 128 per cent.[23] An essential reason why plant concentration has not increased since 1922 is therefore to be found in the forces making for growth and industrialization in the Canadian economy.

While this is not the place for an analysis of these forces, some of the immediate stimuli to the expansion of manufacturing will be briefly reviewed. During the cyclical upswing of 1925 to 1929 the increased demand for manufactures appears to have been mainly consumer demand, reflecting the rise in real income per head and (to a lesser extent) the increase in population (from 9 million in 1923 to 10 million in 1929). Exports played a major role in the great expansion of the automobile, newsprint, and nonferrous metals industries, but not in most of the other industries. Booming investment in plant and equipment, largely in the manufacturing industries themselves, also absorbed a substantial portion of the increased output.[24]

In 1937 real gross national product was still slightly below its 1929 level (Table 2), but real manufacturing output was higher than in 1929, and the proportion of national income originating in manufacturing had increased. Substantial increases in tariff rates during the

[23] Appendix A, Table A-5 and *Reference Paper 40*, Ottawa, Dominion Bureau of Statistics, February 1953.

[24] See e.g., M. Q. Innis, *Economic History of Canada*, Toronto, Ryerson, 1943, p. 319; V. W. Malach, "Internal Determinants of the Canadian Upswing, 1921–29," *Canadian Journal of Economics and Political Science*, Vol. 16, 1950, pp. 184–198; *National Accounts, Income and Expenditure, 1926–1950*, Ottawa, Dominion Bureau of Statistics, December 1951, pp. 28–29.

The role of exports in the expansion was small for manufacturing as a whole as shown by the following figures:

	(*dollars in billions*)		
	1923	*1929*	*Increase*
Total manufacturing output	2.7	3.9	1.2
Exports of partly or fully manufactured goods	0.6	0.7	0.1

But the importance of exports in the three industries mentioned in the text is shown by the following figures:

	(*dollars in millions*)		
	1923	*1929*	*Increase*
Newsprint output	93	151	58
Newsprint exports	73	142	69
Automobiles output	97	177	80
Automobiles exports	27	43	16
Nonferrous metals, smelters and refineries, output	20	110	90
Nonferrous metals and products, exports	44	113	69

Source: Canada Year Book, 1924, 1925, 1930, and *1932*, Ottawa, Dominion Bureau of Statistics.

depression were followed by a considerable reduction in the ratio of imports to domestic output of many manufactures,[25] and the establishment of numerous branch plants of United States corporations in Canada. Table 34 illustrates the importance of the depression period in reducing Canadian dependence on imported manufactures.

TABLE 34

Output and Imports of Manufactures in Canada

	Value of Output of Manufacturing Industries	*Net Imports* [a] *of Fully or Partly Manufactured Goods*	*Col. 2 ÷ Col. 1*
	(billions of dollars)		*(%)*
1923	2.66	0.64	24
1929	3.88	0.94	24
1937	3.63	0.57	16
1944	9.07	1.30	14
1948	11.88	1.87	16

[a] Imports less re-exports.

Source: The Manufacturing Industries of Canada, 1948, Ottawa, Dominion Bureau of Statistics, p. 14 and *1941,* p. 14.

The nonferrous metals industries expanded strikingly with the opening up of new ore deposits. Between 1929 and 1937 the net value added in the smelting and refining of nonferrous metals rose from $68.4 million to $101.8 million.

After the recession of 1938, manufacturing output expanded rapidly in response to the war requirements of Canada and her allies (including large demands for food and clothing). The estimated percentage of manufacturing employment directly devoted to war orders rose from 9 per cent in 1939 to 37 per cent in 1941 and 64 per cent in 1943.[26] After a brief period of declining output following the peak of 1944, expansion was resumed in 1946 under the stimulus of an unprecedented investment boom.

Thus, in the period since 1920, expansion of the market has more than offset the increase in plant size. As a result the number of plants has increased from 21.1 thousand in 1923 to 33.4 thousand in 1948. The degree of inequality of plant size has remained approximately the same (Table A-2) so that concentration has declined. At the same time the development of motor transportation and improvements in railroad transportation have continued to break down the regional

[25] Cf. W. A. Mackintosh in *Report of the Royal Commission on Dominion Provincial Relations,* Appendix 3, *The Economic Background of Dominion Provincial Relations,* Ottawa, King's Printer, 1939, pp. 89–96.

[26] Estimates from records of Department of Munitions and Supply quoted in *Private and Public Investment in Canada, 1926–51,* Ottawa, Dept. of Trade and Commerce, 1951, p. 37.

segregation of markets, so that plant concentration by market areas has probably declined.

Growth of the market is therefore revealed as an important factor, which a theory of concentration cannot afford to neglect. Further growth of the Canadian economy can be expected to exercise a continued moderating influence on the level of concentration. Should concentration nevertheless increase, the theory that such an increase is necessary for technological efficiency should be treated with distrust.

APPENDIXES